Exhibit A

IDT Team	Bob Schwenker/US/HGST@HGST Ian McFadyen/US/HGST@HGST Lew Nunnelley/US/HGST@HGST Arthur Wall/US/HGST@HGST Richard Hsiao/US/HGST@HGST Ciaran Fox/US/HGST@HGST Jinshan Li/US/HGST@HGST Leslie Reiter/US/Contr/HGST
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***Main Idea**

1. Background: What is the problem solved by your invention? Describe known solutions to this problem (if any). What are the drawbacks of such known solutions, or why is an additional solution required? Cite any relevant technical documents or references.

Control of the flying heigh in heads for magnetic recording is important for head performance. Due to the variation in the ABS processing and shield recession variation in the slider lapping, there is a significant variation in the magnetic spacing. Additionally, write- and temperature-induced protrusion causes variation in the flying height, typically requiring increase in the magnetic spacing to prevent reliability issues of the head-to-disk interactions. Finally, HDD's have to operate at different altitudes, resulting in variation of the flying height. One of the previously proposed ways to overcome these issues is use of the heater inside the head structure. By adjusting the current into the heater, a controlled increase in the head temperature can be obtained, resulting in the protrusion of the head elements towards the disk, thus, controling the magnetic spacing. There are three main disadvantages of such design. First, the temperature of the read element is increased, thereby effecting its reliability. Second, the thermal response is slow (~1msec), limiting applications of this design to a slow adjustment of the flying height. Third, this design requires relatively high power consumption in order to produce adequate flying height adjusments.

2. Summary of Invention: Briefly describe the core idea of your invention (saving the details for questions #3 below). Describe the advantage(s) of using your invention instead of the known solutions described above.

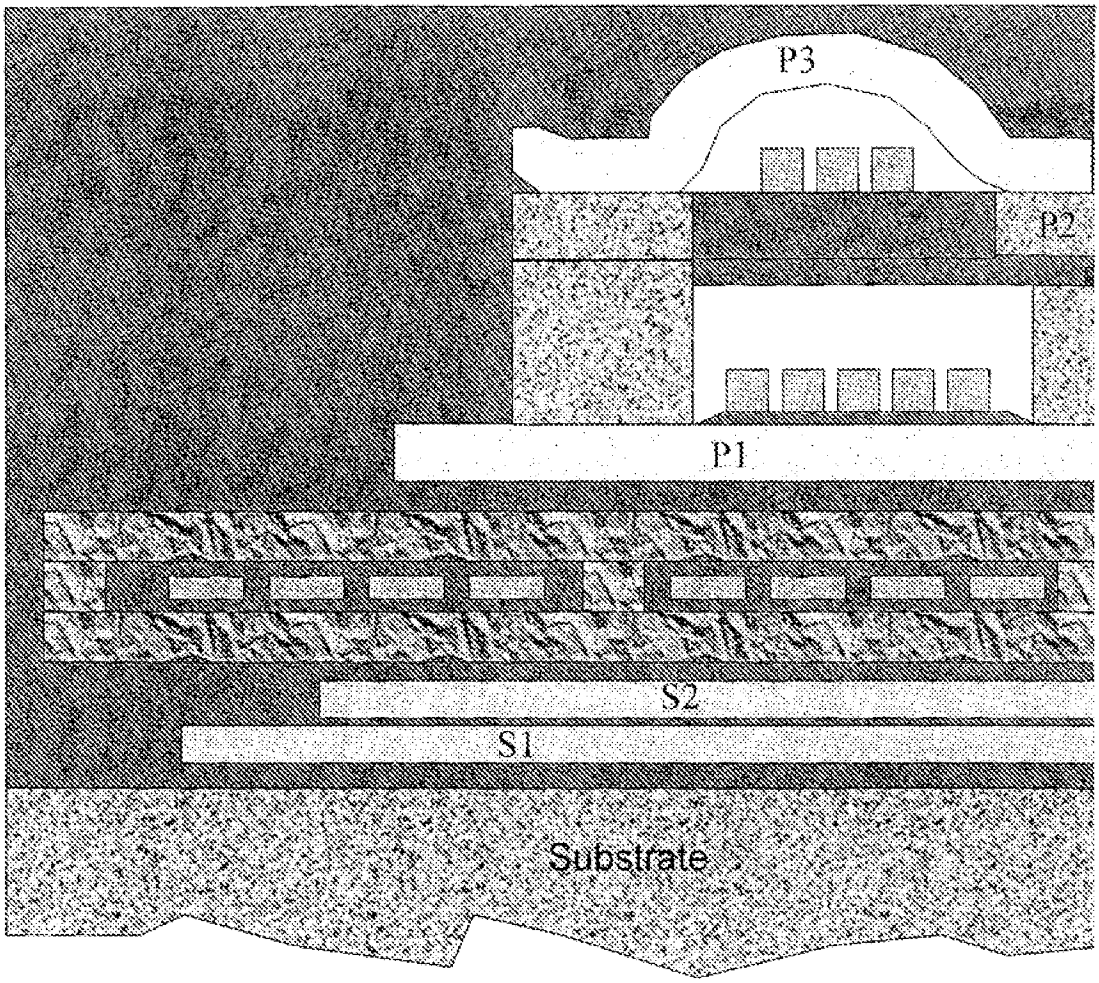
We disclose the idea of adjusting flying height using magnetomechanical effect. In this design, a torroid structure comprizing of magnetic material with high magnetostriction is incorporated into the head. By applying a small current into the coil inside torroid, its magnetization is varied, resulting in a controlled deformation due to magnetomechanical effect. Elogation in the torroid lead to protrusion of the head elements towards the disk, thus enabling contol of the magnetic spacing.

The main advantages of this approach are:

- fast response in adjusting flying heigh (magnetization changes can be as fast as few nanoseconds)
- low power consuption (a few mA of current are sufficient to fully saturate the torroid, corresponding to a maximum deformation)
- negligible increase in the sensor temperature (since mechanical deformation is induced using magnetostriction only -- not the temperature gradient)

3. Description: Describe how your invention works, and how it could be implemented, using text, diagrams and flow charts as appropriate.

An example of the proposed head structure is shown in the figure below. The torroid structure (A) is build into the head using conventional processing steps, practically identical to the processed used for the write head yoke. The preferred material for torroid is one with high magnetostriction (lambda). Alloys such as CoFe with 50/50 or 40/60 composition are well suited for this purpose, since they have high magnetostriction value of 40-50 e-6 and they can be electro-plated. The magnetization easy axis is set parallel to the ABS surface by field-plating and optional annealing in the magnetic field.



Control of the flying hight is implemented as follows. In the absence of the current in the torroid, its magnetization is parallel to the ABS (out of the picture plane), as set by magnetic anisotropy. As we apply current to the torroid coils, magnetization is rotating towards ABS surface. Due to magnetostriction of the torroid material, this causes elongation of the torroid in the direction perpendicular to the ABS surface, and is approximately described by the following equation:

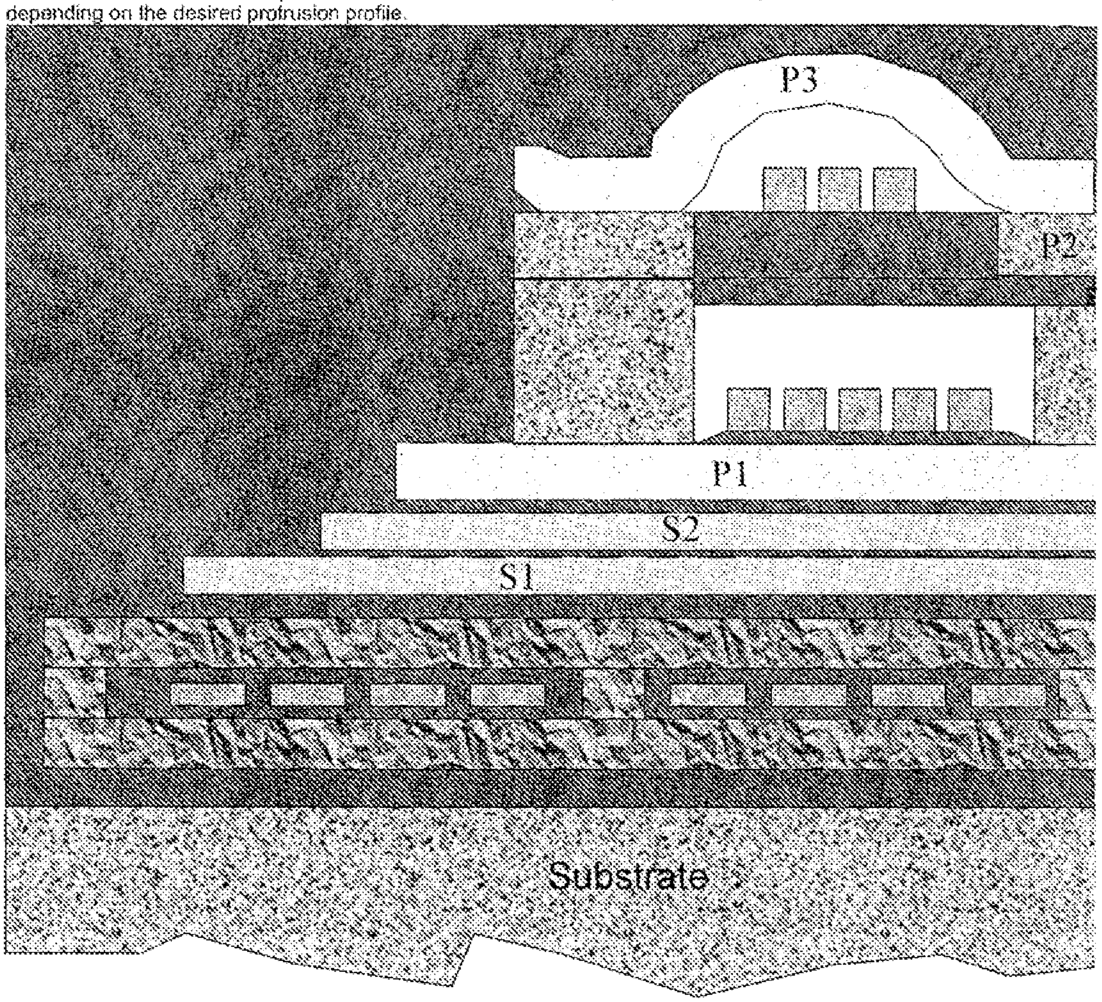
$$\Delta L = L \cdot \frac{3}{2}\lambda(1-\cos^2\varphi),$$

where ΔL is the strain of the torroid, L is the length of the torroid,

λ is magnetostriction, and φ is the angle of the magnetization with respect to the direction normal to the ABS

Since by varying the current into the coils one can precisely contol magnetization, deformation of the torroid can be tuned to the desired level. The mechanical deformation in the torroid causes strain in the

head elements, moving them closer to the disk.
This method provides more than adaquate range of spacing control. For example, a 200um long CoFe torroid (labda=40e-6) has a range of protrusion from 0 to 12nm, and scales with the torroid length.
Due to low magnetic reluctance of the torroid, small current into the torroid coil are needed to fully rotate its magnetization, and, depending on the nubmer of coil turns, are as small as 1-10mA.
Torroid structure can be incorporated as shown above, or can be placed on the top or bottom of the head, depending on the desired protrusion profile.



***Patent Value Tool**

* 1. Select the single most appropriate technology category for your invention from the following technologies list.
(301) PPM 300 Storage Devices/Systems and Software-301 Magnetic thin film heads (not MR)
Comments
Are there any additional significant markets where the invention is likely to have impact?